Abstracts

Mode-matching CAD of rectangular or circular multiaperture narrow-wall couplers

T. Sieverding, U. Papziner and F. Arndt. "Mode-matching CAD of rectangular or circular multiaperture narrow-wall couplers." 1997 Transactions on Microwave Theory and Techniques 45.7 (Jul. 1997 [T-MTT]): 1034-1040.

A rigorous and efficient mode-matching computer-aided design (CAD) method for rectangular waveguide H-plane couplers is presented. The couplers employ multiple large rectangular or circular apertures of different sizes and nonuniform distance. The decomposition of the coupler structure into adequate mode-matching key-building blocks, i.e., the T-junction, double-plane step discontinuity, and rectangular-to-circular waveguide transition, together with the homogeneous intermediate waveguide sections of finite lengths yield the desired high flexibility. Both the finite wall thickness and the higher order mode interaction between all discontinuities are accurately taken into account by the combination of the individual building blocks of the generalized scattering matrix technique. Design examples for rectangular and circular aperture provide coupling values of -10.7, -10, -8.1, -5.3, -4.7, -3, -2.6, and -2.3 dB in Ku-band (12-18 GHz), thus demonstrating the flexibility and the efficiency of the method. The theory is verified by excellent agreement with measurements.

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